The Clear Alternative: Methanol Fuel Cell Vehicles

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Background

Last year, new record highs were recorded for global temperatures. When you consider that every gallon of gasoline burned in an automobile produces 20 pounds of carbon dioxide, it is easy to see why the transportation sector of the economy is responsible for one-third of all carbon dioxide emissions. Emissions from 190 million cars, trucks, and buses on the road account for about half of all air pollution B more than 80% in major cities. Efforts to diminish the environmental damage or automobile use have, for the past 50 years, focused initially focused on adding control devices to the internal combustion engine and recently on producing cleaner gasoline. However, these gains are jeopardized by the increasing number of vehicles on the road.

Many thoughtful people have concluded that the 100-year reign of the petrol-fueled, internal combustion engine must begin to give way. In its place, we need a clean, advanced-technology vehicle that retains all the performance and consumer convenience of today=s automobile while offering an alternative to our dependence on oil. Fortunately, it is now clear that fuel cell vehicles will soon be available to meet this challenge.

The Promise of Methanol Fuel Cell Vehicles

Methanol B a liquid fuel made from natural gas or renewable biomass resources B is the leading candidate to provide the hydrogen necessary to power fuel cell vehicles. The commercialization of methanol-powered fuel cells will offer practical, affordable, long-range electric vehicles with zero or near-zero emissions while retaining the convenience of a liquid fuel. By 2004 or sooner, fuel cells operating on methanol will power a variety of cars and buses in the U.S. and worldwide.

Automakers and component suppliers are spending billions of dollars to develop these advanced technology vehicles. The industry leaders include Daimler-Chrysler, Ford, General

Motors, Toyota, Volkswagen, Nissan, Honda and Volvo. The broad-based industrial commitment to fuel cell vehicles derives from their inherent energy efficiency and low emissions. Today=s internal combustion engine converts only 19% of the useful energy in gasoline to turning a car=s wheels. Methanol fuel cell vehicles are projected to achieve efficiencies of at least 38%, while bringing smog-precursor emissions close to zero and cutting greenhouse gas emissions in half.

On April 20th, California Governor Gray Davis today announced that fuel cell vehicles will soon be appearing on the State=s streets and freeways. Automakers DaimlerChrysler and Ford, and their fuel cell vehicle development partner Ballard Power Systems, Inc. will demonstrate as many as 50 fuel cell cars and buses in the State between now and 2003. Three major oil companies also committed to working on the refueling infrastructure needed to serve these vehicles. On that same day, General Motors and Toyota announced that they are working together to develop fuel cell vehicles.

Methanol has emerges as the ideal hydrogen carrier for vehicles because it is liquid at room temperature and ambient pressure. Methanol is a simple molecule consisting of a single carbon atom bonded to three hydrogen atoms and one oxygen-hydrogen group. Releasing the hydrogen from its bonds in a methanol molecule is easier to accomplish than for other available liquid fuels. Methanol fuel cell vehicles use a steam reformer operating at relatively low temperatures to split the methanol molecule and produce the hydrogen needed by the fuel cell stack. Another fuel cell technology is on the horizon: the direct methanol fuel cell. This technology is expected to reach commercial maturity as early as 2008, just a few years after the introduction of steam reformer methanol fuel cell vehicles.

A study by the environmental engineering firm EA Engineering, Inc., conducted for the American Methanol Institute, found that refueling stations for dispensing methanol are very similar to today=s gasoline stations, and conversion capital costs are moderate. Many existing gasoline underground storage tanks can be adapted to store and dispense methanol for less than $20,000, while the capital cost for adding new methanol capacity to an existing service station is about $60,000. This estimate shows that for about a $550 million investment, all of California=s 11,700 service stations can be adapted to serve methanol. This compares quite well with the $4 billion in capital costs oil refiners spent over a three-year period to produce cleaner-burning gasoline in the State.

At the pump, methanol is competitively priced with gasoline. In California, the pump price for methanol at 38 retail stations ranges from 87.94 to $1.10 per gallon. According to the California Energy Commission, the average price for regular unleaded gasoline for the week of April 12th was $1.624. Today, methanol is sold in California to serve over 11,000 Aflexible fuel≅ vehicles that use either methanol or gasoline in an internal combustion engine.

A study by the environmental engineering firm Malcolm Pirnie, Inc. conducted for AMI found far fewer environmental threats from using methanol in fuel cell vehicles, compared to gasoline=s use for internal combustion engines. This is due to the inherent properties of the chemical: it is capable of completely mixing with water; degrades quickly in the atmosphere;

and -- most importantly -- will rapidly biodegrade in surface waters and underground. Generally, methanol is less toxic to humans than gasoline, and is neither mutagenic nor carcinogenic.